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# NASA Policy Directive

**NPD 8730.2C**Effective Date: November 03,  
2008Expiration Date: November 03,  
2013**COMPLIANCE IS MANDATORY**[Printable Format \(PDF\)](#)

Request Notification of Change

(NASA Only)

## Subject: NASA Parts Policy

**Responsible Office: Office of Safety and Mission Assurance**

### 1. POLICY

It is NASA policy to control risk and enhance reliability in NASA spaceflight and critical ground support/test systems, in part, by managing the selection, acquisition, traceability, testing, handling, packaging, storage, and application of the following:

- a. Electrical, electronic, and electromechanical (EEE) parts.
- b. Electronic packaging and interconnect systems.
- c. Mechanical parts such as fasteners, bearings, studs, pins, rings, shims, piping components, valves, springs, brackets, clamps, and spacers.
- d. Manufacturing materials affecting the performance/acceptability of parts such as plating, solder, and weld filler material.

### 2. APPLICABILITY

- a. This NPD applies to NASA Headquarters, NASA Centers, including Component Facilities, NASA programs and projects, and to the JPL and other NASA contractors and grantees as delineated in their contracts or grants.
- b. This NPD applies to flight hardware, critical ground support equipment (GSE), and critical ground test systems used in Category 1 and Category 2 projects as defined by NPR 7120.5D, NASA Space Flight Program and Project Management Requirements, and/or Class A, B, or C payloads as defined by NPR 8705.4, Risk Classification for NASA Payloads, Appendix A.
- c. The requirements of this NPD apply to NASA acquisition contracts initiated following promulgation of this NPD. Retroactive application of this NPD to existing acquisition contracts is at the discretion of the applicable NASA program manager and shall be

based on a determination of risk related to the retention of existing requirements versus implementation of the requirements of this NPD.

d. This NPD does not apply to institutional projects as defined by NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Requirements, or to Research and Technology Development Programs and Projects as defined by NPR 7120.8, NASA Research and Technology Program and Project Management Requirements.

### **3. AUTHORITY**

a. 42 U.S.C. 2473(c) of the National Aeronautics and Space Act of 1958, as amended.

b. 15 CFR Part 287, Guidance on Federal Conformity Assessment (latest revision in effect).

c. OMB Circular A-119, Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities.

### **4. APPLICABLE DOCUMENTS**

a. NPR 7120.5D, NASA Space Flight Program and Project Management Requirements.

b. NPR 8705.4, Risk Classification for NASA Payloads.

c. NPR 8705.6, Safety and Mission Assurance Audits, Reviews, and Assessments.

d. NPR 8735.1, Procedures for Exchanging Parts, Materials, and Safety Problem Data Utilizing the Government-Industry Data Exchange Program (GIDEP) and NASA Advisories.

e. NASA-STD-6008, NASA Fastener Procurement, Receiving Inspection, and Storage Practices for Spaceflight Hardware.

f. NASA Parts Selection List (NPSL): <http://nepp.nasa.gov/npsl>.

g. NASA Tin and Other Metal Whisker website: <http://nepp.nasa.gov/whisker>.

h. Government Electronics and Information Association (GEIA)-STD-0005-1, Performance Standard for Aerospace and High Performance Electronic Systems Containing Lead-free Solder.

i. GEIA-STD-0005-2, Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High Performance Electronic Systems.

j. GEIA-HB-0005-1, Program Management/Systems Engineering Guidelines For Managing The Transition To Lead-Free Electronics.

k. GEIA-HB-0005-2, Technical Guidelines for Aerospace and High Performance Electronic Systems Containing Lead-free Solder and Finishes.

l. SAE AS5553, Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition.

### **5. RESPONSIBILITY**

a. The Chief, Safety and Mission Assurance shall:

(1) Ensure that effective processes and controls are in place for parts and materials within NASA programs and projects and at NASA Centers ([Requirement 59072](#)).

Assurance methods include auditing, conducting program reviews, and establishing and tracking performance parameters.

(2) Maintain a NASA Parts Selection List (NPSL) to provide candidate selections for program use ([Requirement 59073](#)).

(3) Participate in the Defense Standardization Program and appropriate voluntary consensus standards programs for EEE and mechanical parts commodities ([Requirement 59074](#)).

b. Center Directors shall:

(1) Ensure effective implementation of Center parts and materials management plans, requirements, and procedures ([Requirement 59076](#)).

(2) Support program/project office implementation of requirements specified below ([Requirement 59077](#)).

c. NASA Center Safety and Mission Assurance Directors or other designee (s), as assigned by the Center Director, shall:

(1) Perform surveys, audits, product inspections, qualification testing, risk assessments, and/or production line certifications to verify the capability and qualification of supply sources ([Requirement 59079](#)).

The results of surveys, audits, and product inspections performed by other Centers, other Government agencies, accredited third-party organizations, or the private sector may be utilized on a risk-informed basis as a supplement to, or a substitute for, direct surveillance.

(2) Provide the results of supplier audits/surveys, product inspections, qualification testing, risk assessments, and production line certifications to other NASA Centers by way of the NASA Supplier Assessment System (<http://sas.nasa.gov>) ([Requirement 59080](#)).

(3) Coordinate conformity assessment activities, including, but not limited to, the conduct of joint supplier audits and the sharing of conformity assessment information, with those of other NASA Centers, appropriate Government agencies, and the private sector to reduce unnecessary duplication ([Requirement 59081](#)).

Federal guidelines concerning the performance of joint conformity assessment activities are provided in 15 CFR Part 287, Guidance on Federal Conformity Assessment.

(4) Ensure that conformity assessment processes used by other Government agencies, third-party auditors, and the private sector, when utilized per paragraphs 5.c.(1) and 5.c.(3) above, provide satisfactory assurance of source capability and qualification ([Requirement 59082](#)).

(5) Report nonconforming, defective, and/or suspected counterfeit parts in accordance with NPR 8735.1, and for all cases involving counterfeit parts or other potential fraud, to the NASA Office of Inspector General and the NASA Director, Acquisition Integrity Program (AIP) ([Requirement 59083](#)).

d. NASA Center Engineering Offices, as assigned by the Center Director, shall support program/project offices in carrying out applicable requirements specified in paragraph 5.f below ([Requirement 59084](#)).

e. Contracting Officers, as assigned by the Center Director, shall support program/project offices in carrying out applicable requirements of this NPD in accordance with Federal Acquisition Regulations (FAR) and NASA FAR Supplement (NFS) requirements ([Requirement 59085](#)).

f. Program, project, and Government Furnished Equipment (GFE) managers shall:

(1) Develop and implement integrated parts management requirements, procedures, and plans ([Requirement 59087](#)).

(2) Select parts, materials, and packaging technology based on their intended use considering, but not limited to, performance, environment, criticality, and mission lifetime requirements ([Requirement 59088](#)).

Information and guidance concerning parts selection is provided on the NASA Parts Selection List (NPSL), <http://nepp.nasa.gov>.

(3) Flow down applicable requirements of this document to NASA contractors, subcontractors, and grantees ([Requirement 59089](#)).

(4) Document the derating criteria for EEE parts ([Requirement 59090](#)).

(5) Mitigate risks associated with lead-free solder and surface finishes in accordance with criteria provided in Attachment A ([Requirement 59091](#)).

(6) Develop, document, and implement a counterfeit EEE parts control plan for the avoidance, detection, mitigation, disposition, control, and reporting of counterfeit EEE parts ([Requirement 59092](#)).

Control plans may be project unique or apply to multiple Center projects. Guidelines concerning counterfeit parts control plan contents are provided in Attachment B. Detailed guidance and definitions are provided in AS5553.

(7) Implement NASA-STD-6008 for control of fasteners ([Requirement 59093](#)).

## 6. DELEGATION OF AUTHORITY

None.

## 7. MEASUREMENTS/VERIFICATION

Compliance with the requirements contained in this NPD is verified through processes contained in NPR 8705.6, Safety and Mission Assurance Audits, Reviews, and Assessments.

## 8. CANCELLATION

NPD 8730.2B, dated June 8, 1998.

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**/s/ Michael D. Griffin**  
**Administrator**

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### ATTACHMENT A: (TEXT)

#### **ATTACHMENT A: Criteria to Mitigate Risks Associated with Lead-Free Solder and Surface Finishes**

- a. Tin-Lead (Sn-Pb) based solders and Sn-Pb part surface finishes (minimum 3% Pb by weight) shall be used whenever possible for the assembly of electronics hardware intended for NASA spaceflight and critical ground support applications (Requirement). The use of lead-free (Pb-free) solders or Pb-free Sn-based part surface finishes may be allowed when justified by technical need, but only by exception and with the approval of the parts, materials, and processes control board for the NASA project or an equivalent authority.
- b. A Lead-Free Control Plan (LFCP) shall be developed that meets the requirements set forth in GEIA-STD-0005-1, including special design considerations, manufacturing process controls, test and qualification requirements, quality inspection and screening, marking and identification, maintenance and repair processes, and other steps taken to mitigate risks and to ensure the reliability of hardware for the intended application (Requirement). Control plans may be project unique or apply to multiple Center projects. GEIA-HB-0005-1, GEIA-HB-0005-2, and the NASA Tin and Other Metal Whisker Web site, <http://nepp.nasa.gov/whisker>, may be consulted to obtain information related to the problems lead-free electronics present. In addition to pure tin, other metals such as pure zinc and pure cadmium may result in harmful metal whiskers. Identification of controls related to other metal surface finishes is determined at the NASA Center level.
- c. A control plan shall be developed to reduce the harmful effects of tin whiskers that meets Level "2C" requirements set forth in GEIA-STD- 0005-2 (Requirement). Less stringent control plans meeting Level "2B" are allowed in exceptional cases with the approval of the parts, materials and processes control board or an equivalent authority. Control plans may be project unique or apply to multiple Center projects.
- d. The use of Pb-free (<3% Pb) Sn-based solders and surface finishes in applications below 13.2°C shall be assessed for the risk of the damaging effects of tin pest formation

(Requirement). Tin pest refers to the allotropic phase transformation of tin that can occur which turns tin from a ductile conductor into a brittle semiconductor.

Note: The introduction of lead containing solders presents an employee exposure hazard that is regulated under OSHA (29 CFR 1910.1025). This regulation requires baseline hazard assessments be performed for any operation (e.g., generation of metal dust or fume) that may result in employee exposure to lead, and additional medical surveillance, employee training, monitoring, and exposure control requirements when a positive exposure assessment is made. Exposure risk, based on past assessments, is very low for piecework operations and moderate for assembly line or classroom instruction based on work volume.

Regardless of the exposure assessment outcome, all affected employees are required to complete Hazard Communication training for Chemical Users and individual employee review of 29 CFR 1910.1025, Appendix A, "Substance data sheet," and B, "Employee Standard Summary." This training may be provided at the supervisory level by employee review of the referenced appendices available from Environmental Health. Additionally, all soldering workstations will require use of local exhaust ventilation (fume extractors) and regular cleaning to prevent buildup of lead residue on work surfaces.

## **ATTACHMENT B: Counterfeit Parts Control Plan Contents**

### **a. Parts Availability Process:**

Maximize availability of authentic, originally designed, and qualified parts throughout the product's life cycle, including, for example:

- (1) Control of parts obsolescence.
- (2) Alternate/multiple sources.
- (3) Acceptable product substitutions.
- (4) System redesign.
- (5) Inventory control, parts sparing, and/or lifetime buy practices.
- (6) Planning for adequate procurement lead times in support of manufacturing and delivery schedules.

### **b. Procurement Process:**

(1) Assess potential sources of supply to determine the risk of receiving non-authentic parts. Original Component Manufacturers (OCM), OCM-authorized suppliers (e.g., franchised distributors), and authorized aftermarket manufacturers are considered to have low risk of supplying non-authentic parts. Assessment actions include surveys, audits, review of product alerts (e.g., GIDEP, ERAI), and analysis of supplier quality data to determine past performance. (Note: GIDEP and ERAI product alerts are accessible through NASA's Supplier Assessment System (<http://sas.nasa.gov/>).)

(2) Mitigate risks of procuring counterfeit parts from sources other than OCMs or authorized suppliers.

(3) Factor risk of receiving nonauthentic parts into the source selection process.



(4) Ensure that approved/ongoing sources of supply are maintaining effective processes for mitigating the risks of supplying counterfeit EEE parts.

(5) Include applicable contract/purchase order quality requirements related to counterfeit parts prevention. Examples of quality requirements are provided in AS5553, including:

(a) Certificate of Conformance.

(b) Mandatory Product Tests and Inspections.

(c) Supply Chain Traceability.

(d) Federal Penalties Associated with Fraud and Falsification.

(6) Specify contractor flow down of applicable counterfeit parts prevention requirements to their subcontractors.

c. Product Assurance Process:

Verify receipt of authentic conforming parts, commensurate with product risk. Product risk is determined by the criticality of the part and the assessed likelihood of receiving a nonauthentic part. Product assurance actions include review of data deliverables, verification of purchase order quality clause compliance, visual inspection, measurements, non-destructive evaluation (e.g., x-ray, hermeticity, marking permanency) and destructive testing (e.g., destructive physical analysis, thermal cycling, construction analysis).

d. Material Control and Disposition Process:

(1) Identify and quarantine suspect or confirmed counterfeit parts.

(2) Confirm conclusively whether the parts are authentic or counterfeit. This may include further part-level testing or communication with the parts' (supposed) OCM.

(3) Upon confirmation that a part is counterfeit, identify and place on "Hold" all potential additional counterfeit parts in storage and identify installed counterfeit parts pending disposition by appropriate authorities.

(4) Destroy, and/or submit to investigative authorities confirmed counterfeit parts. Counterfeit parts should only be returned to suppliers under controlled conditions so as to prevent their re-entry into the supply chain.

e. Reporting Process:

Report nonconforming, defective, and/or suspected counterfeit parts in accordance with NPR 8735.1, and for all cases involving counterfeit parts or other potential fraud, to the NASA Office of Inspector General and the NASA Director, Acquisition Integrity Program (AIP).

**(URL for Graphic)**

None.

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